

Amendments to the Specification:

Please add the following new paragraph after the Title and before the first paragraph on page 1:

THIS APPLICATION IS A U.S. NATIONAL PHASE APPLICATION OF PCT INTERNATIONAL APPLICATION PCT/JP2004/009506.

Please replace the paragraph, beginning at page 2, line 1, with the following rewritten paragraph:

In addition, "Phosphor Handbook" (Ohmsha, Ltd., pages 219 ~~and 225-220~~) and other non-patent publications disclose a technique in which each of these phosphors is made by the process of mixing certain raw materials and firing them at a temperature of 1000 deg-C or higher to cause a solid phase reaction.

Please replace the paragraph, beginning at page 4, line 13, with the following rewritten paragraph:

The discharge failures can be prevented to some extent if all the phosphors are composed of the materials having positive charges (+), such that the panel employs a combination of green phosphor made of a mixture of any of $\text{BaAl}_{12}\text{O}_{17}:\text{Mn}$, $\text{BaAl}_{12}\text{O}_{19}:\text{Mn}$, $\text{BaMgAl}_{10}\text{O}_{17}:\text{Mn}$, $\text{BaMgAl}_{10}\text{O}_{23}:\text{Mn}$, (Y, Gd) $\text{BO}_3:\text{Tb}$ and $\text{LaPO}_4:\text{Tb}$, all having positive charges (+), in place of the Zn_2SiO_4 of negative charge (-), blue phosphor of $\text{BaMgAl}_{10}\text{O}_{17}:\text{Eu}$, and red phosphor of any of (Y, Gd) $\text{BO}_3:\text{Eu}$ and $\text{Y}_2\text{O}_3:\text{Eu}$.

Please delete the paragraph, beginning at page 5, line 22:

~~In other words, the green phosphor used here as the chemical compound featuring high brightness, carrying positive charge (+) and not being liable to react with water and hydrocarbon gases is one of or any combination of two or more kinds of phosphors selected from among $\text{Zn}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}$, $\text{Mg}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}$, $\text{Ca}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}$, $\text{Sr}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}$, (Y, Gd) $(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Tb}$, (Y, Gd) $\text{BO}_3:\text{Tb}$, (Y, Gd) $(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Ce}$, Tb , $\text{Y}_3(\text{Ga}_{1-x}\text{Al}_x)_5\text{O}_{12}:\text{Tb}$ and $\text{ZnAl}_2\text{O}_4:\text{Mn}$.~~

Please replace the paragraph, beginning at page 9, line 27, with the following rewritten paragraph:

Fig. 4 is a cross sectional view of PDP 100. Dimension "W" of the spaces formed by barrier ribs 109, as shown in Fig. 4, is fixed to a given value, or approx. 130μm to 240μm, for example in the case of high-definition TV of 32 to 50 inch size. Inside the grooves between barrier ribs 109, there are phosphor layers formed of a red phosphor of yttrium oxide group as red phosphor layers 110R, of which surfaces are charged positive (+), as well as phosphor layers formed of a blue phosphor having a β-alumina crystal structure as blue phosphor layers 110B, of which surfaces are also charged positive (+). There are also green phosphor layers 110G formed of a green phosphor comprising at least one or a combination of any materials selected from among spinel group compounds of $M(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}$ (where "M" denotes one of Zn, Mg, Ca and Sr) containing aluminum, of which surfaces are charged ~~negative~~positive (+), and aluminate group compounds of $(\text{Y}_{1-a-y}\text{Gd}_a)\text{BO}_3:\text{Tb}_y(\text{Y}_{1-x}\text{Gd}_x)\text{BO}_3:\text{Tb}$, $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Tb}_y(\text{Y}_{1-x}\text{Gd}_x)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Tb}$, $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Ce}_y\text{Tb}_y(\text{Y}_{1-x}\text{Gd}_x)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Ce}_y\text{Tb}$, and $(\text{Y}_{1-a-y}\text{Gd}_a)_3(\text{Ga}_{1-x}\text{Al}_x)_5\text{O}_{12}:\text{Tb}_y(\text{Y}_{1-a-y}\text{Gd}_a)_3(\text{Ga}_{1-x}\text{Al}_x)_5\text{O}_{12}:\text{Tb}_y$ containing yttria, of which surfaces are also charged positive (+). These phosphor layers 110R, 110G and 110B are formed of phosphor inks of the individual colors made of color phosphor particles dissolved with organic binder into paste form, which are deposited on the inner surfaces of the barrier ribs, and fired at a temperature of approximately 500 deg-C to burn off the organic binder and to firmly bind together the color phosphor particles. It is desirable to form these phosphor layers 110R, 110G and 110B so that thicknesses "L" of the layers deposited above address electrodes 107 becomes approximately 8 to 25 times the mean diameter of the phosphor particles of individual colors. In other words, it is desirable for the phosphor layers to have a thickness equal to at least 8 layers and preferably about 20 layers of the phosphor particles in order to ensure a sufficient brightness (i.e., emission efficiency) when ultraviolet rays of a given intensity are irradiated to these phosphor layers. This is because any thickness greater than the above value results in a virtual saturation of the emission efficiency of the phosphor layers, and deprives discharge spaces 122 of sufficient size.

Please replace the paragraph, beginning at page 11, line 3, with the following rewritten paragraph:

The front panel and the rear panel produced as described above are placed together in a manner that the individual electrodes on the front panel cross at right angles with the address

electrodes on the rear panel, and they are hermetically sealed by putting sealing frit throughout the perimeter of the panels and firing it at about 450 deg-C for 15 minutes to form hermetic seal layer 121. After that, the interior of discharge space 122 is evacuated to a high vacuum of 1.1×10^{-4} Pa, for instance, and filled with discharge gas comprising a mixture of inert gases such as He-Xe group, Ne-Xe group, He-Ne-Xe group and Ne-Kr-Xe group gases to a predetermined pressure (i.e., 50 to 80kPa) with 5% or more in the partial pressure of Xe. PDP 100 is thus manufactured. This panel is completed after being subjected to an aging process for 5 hours under the conditions of ~~175~~185V in discharge voltage and 200kHz in discharge frequency.

Please replace the paragraph, beginning at page 17, line 11, with the following rewritten paragraph:

In the process of making a mixed solution, raw materials of yttrium nitrate, $Y_2(NO_3)_3$, gadolinium nitrate, $Gd_2(NO_3)_3$, boric acid, H_3BO_3 , and europium nitrate, $Eu_2(NO_3)_3$ are mixed ~~to that~~ a mole ratio of (Y,Gd), B, and Eu must become 1-X:2:X (where $0.05 \leq X \leq 0.20$). In this instance here, amounts of Y and Gd are arranged to a ratio of 65:35. The mixed materials are then fired at 1,200 to 1,350 deg-C for 2 hours in an air ambient, and classified to obtain the red phosphor. Since the red phosphor is fired in the air ambient, it contains comparatively small number of oxygen defects even if it is not annealed in an oxygen and nitrogen atmosphere. However, it is desirable to anneal it again because defects may develop in the process of classification.

Please replace the paragraph, beginning at page 18, line 15, with the following rewritten paragraph:

As described above, green phosphors used in this invention are the spinel group phosphors such as $Zn(Ga_{1-x}Al_x)_2 O_4:Mn$, $Mg(Ga_{1-x}Al_x)_2 O_4:Mn$, $Ca(Ga_{1-x}Al_x)_2 O_4:Mn$ and $Sr(Ga_{1-x}Al_x)_2 O_4:Mn$, of which surfaces are charged positive (+). Also used are green phosphors containing yttria such as $(Y_{1-a-y}Gd_a)BO_3:Tb_y(Y_{1-x}Gd_x)BO_3:Tb$, $(Y_{1-a-y}Gd_a)(Ga_{1-x}Al_x)_3(BO_3)_4:Tb_y(Y_{1-x}Gd_x)Al_3(BO_3)_4:Tb$, $(Y_{1-a-y}Gd_a)(Ga_{1-x}Al_x)_3(BO_3)_4:Ce_yTb_y(Y_{1-x}Gd_x)Al_3(BO_3)_4:Tb$, $(Y_{1-a-y}Gd_a)_3(Ga_{1-x}Al_x)_5O_{12}:Tb_y(Y_{1-x}Gd_x)Al_3(BO_3)_4:Ce$ and $Y_3Al_3Ga_2O_{12}:Tb$, all having their surfaces charged positive (+).

Please replace the paragraph, beginning at page 19, line 14, with the following rewritten paragraph:

Table 1 is a list of combinations of the phosphor samples used for the individual PDP.

[Table 1]

Sample No.	Type and Combination of Green Phosphor	Type of Blue Phosphor	Type of Red Phosphor
1	$\text{Zn}_{1-a}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}_a$ $a=0.01, x=0.5$	$\text{BaMgAl}_{10}\text{O}_{17}:\text{Eu}$	$(\text{Y},\text{Gd})\text{BO}_3:\text{Eu}$
2	$\text{Zn}_{1-a}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}_a$ $a=0.02, x=1.0$	Same as above	Same as above
3	$\text{Ca}_{1-a}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}_a$ $a=0.04, x=1.0$	Same as above	Same as above
4	$\text{Mg}_{1-a}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}_a$ $a=0.03, x=0.5$	Same as above	Same as above
5	$\text{Zn}_{1-a}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}_a$ $a=0.03, x=0.5$	<u>Same as above</u> $(\text{Ba},\text{Sr})\text{MgAl}_{10}\text{O}_{17}:\text{Eu}$	<u>Same as above</u> $\text{Y}_2\text{O}_3:\text{Eu}$
6	$\text{Sr}_{1-a}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}_a$ $a=0.03, x=1$	Same as above	Same as above
7	Mixture of sample no. 1 and $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Tb}_y$ $a=0, x=0.1$ and $y=0.02$ (mixing ratio of 45:55)	<u>$(\text{Ba},\text{Sr})\text{MgAl}_{10}\text{O}_{17}:\text{Eu}$</u> Same as above	<u>$\text{Y}_2\text{O}_3:\text{Eu}$</u> Same as above
8	Mixture of sample no. 2 and $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Tb}_y$ $a=0.5, x=0.5$ and $y=0.3$ (mixing ratio of 45:50)	Same as above	Same as above
9	Mixture of sample no. 3 and $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Ce}_y,$ $\text{Tb}_y, a=0.9, x=1$ and $y=0.02$ (mixing ratio of 50:50)	Same as above	Same as above
10	Mixture of sample no. 4 and $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Tb}_y$ $a=0, x=1$ and $y=0.4$ (mixing ratio of 40:60)	Same as above	Same as above
11	Mixture of sample no. 5 and $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Tb}_y$ $a=0.5, x=0.8$ and $y=0.1$ (mixing ratio of 40:60)	Same as above	Same as above
12	Mixture of sample no. 6 and $(\text{Y}_{1-a-y}\text{Gd}_a)_3(\text{Ga}_{1-x}\text{Al}_x)_5\text{O}_{12}:\text{Tb}_y$ $a=0.5, x=1$ and $y=0.03$ (mixing ratio of 30:60)	<u>Same as above</u> $\text{BaMgAl}_{10}\text{O}_{17}:\text{Eu}$	<u>Same as above</u> $(\text{Y},\text{Gd})\text{BO}_3:\text{Eu}$
13	Mixture of sample no. 4 and $(\text{Y}_{1-a-y}\text{Gd}_a)\text{BO}_3:\text{Tb}_y$ $a=0.5$ and $y=0.03$ (mixing ratio of 40:60)	Same as above	Same as above

14*	Mixture of $\text{Zn}_2\text{SiO}_4\text{:Mn}$ and $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4\text{:Tb}_y$ $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3\text{BO}_3\text{:Tb}_y$ $a=0.5$, $x=1$ and $y=0.03$ (mixing ratio of 50:50)	Same as above	Same as above
15*	Mixture of $\text{BaAl}_{12}\text{O}_{19}\text{:Mn}$ and $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4\text{:Tb}_y$ $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3\text{BO}_3\text{:Tb}_y$ $a=0.5$, $x=1$ and $y=0.03$ (mixing ratio of 50:50)	Same as above	Same as above
16*	$\text{Zn}_2\text{SiO}_4\text{:Mn}$	Same as above	Same as above
17*	$\text{BaMgAl}_{14}\text{O}_{23}\text{:Mn, Eu}$	Same as above	Same as above
18*	$\text{BaAl}_{12}\text{O}_{19}\text{:Mn}$	Same as above	Same as above
19*	Mixture of $\text{BaAl}_{12}\text{O}_{19}\text{:Mn}$ and $\text{LaPO}_4\text{:Tb}$ (mixing ratio of 50:50)	Same as above	Same as above

* Sample numbers 14 to 19 are reference samples for comparison.

Please replace the paragraph, beginning at page 21, line 6, with the following rewritten paragraph:

Phosphor particles used as the green phosphors of samples 7 to 13 are a variety of mixed combinations between one of the spinel group compounds $\text{M}_{1-a}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4\text{:Mn}_a$ (where M represents one of Zn, Mg, Ca and Sr) and one of yttria group compounds $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4\text{:Ce}_y\text{Tb}_y(\text{Y}_{1-b-y}\text{Gd}_b)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4\text{:Tb}_y$, $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4\text{:Tb}_y(\text{Y}_{1-b-y}\text{Gd}_b)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4\text{:Tb}_y$, $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4\text{:Ce}_y(\text{Y}_{1-b-y}\text{Gd}_b)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4\text{:Ce}_y$, $(\text{Y}_{1-a-y}\text{Gd}_a)_3(\text{Ga}_{1-x}\text{Al}_x)_5\text{O}_{12}\text{:Tb}_y$ and $(\text{Y}_{1-a-y}\text{Gd}_a)\text{BO}_3\text{:Tb}_y(\text{Y}_{1-b-y}\text{Gd}_b)\text{BO}_3\text{:Tb}_y$, which are charged positive. Also, phosphor particles used are $(\text{Ba,Sr})\text{MgAl}_{10}\text{O}_{17}\text{:Eu}$ ~~$\text{BaSr-Mg-Al}_{10}\text{O}_{17}\text{:Eu}$~~ as the blue phosphors, and $\text{Y}_2\text{O}_3\text{:Eu}$ as the red phosphors. Table 1 shows individual values of "a", "x", "b" and "y", and kinds of the M element.

Please replace the paragraph, beginning at page 21, line 15, with the following rewritten paragraph:

The green phosphors of samples 14 to 19 for the comparison purpose are phosphor materials, each containing any one of $\text{Zn}_2\text{SiO}_4\text{:Mn}$, $\text{BaAl}_{12}\text{O}_{19}\text{:Mn}$ ~~$\text{Ba-Al}_{12}\text{O}_{19}\text{:Mn}$~~ , $\text{Ba Mg Al}_{14}\text{O}_{23}\text{:Eu, Mn}$ and $\text{LaPO}_4\text{:Tb}$. These samples also use $(\text{Ba,Sr})\text{Al}_{10}\text{O}_{17}\text{:Eu}$ ~~$\text{Ba-Sr-Al}_{10}\text{O}_{17}\text{:Eu}$~~ as the blue phosphor, and $\text{Y}_2\text{O}_3\text{:Eu}$ as the red phosphor. Table 1 shows compositions of the individual phosphors.

Please replace the paragraph, beginning at page 22, line 20, with the following rewritten paragraph:

In the measurements of degradation in the brightness and color temperatures of the panels when lit to the full-on white screen, the PDP were impressed continuously with discharge sustaining pulses of ~~175~~185V and 200kHz in voltage and frequency for ~~500~~1000 hours, and the brightness and color temperatures were measured before and after the operation. Rates of change in brightness degradation (i.e., [(brightness after the operation – brightness before the operation) / brightness before the operation] x 100) and rates of change in color temperatures were obtained from the above results. In determining address error during address discharges, display images were examined for presence or absence of flickers, and an error was determined exist even when there was only one.

Please replace the paragraph, beginning at page 23, line 4, with the following rewritten paragraph:

Table 2 shows results of the above experiments 1 through 4 on the rates of change in the brightness ~~degradation of the green color, and the brightness of as well as~~ the full-on white screen, and also presence and absence of the address error.

Please replace the paragraph, beginning at page 25, line 1, with the following rewritten paragraph:

As shown in Table 2, the green phosphors provided in the reference samples 14 through 19 are a mixture of $\text{Zn}_2\text{SiO}_4\text{:Mn}$ and $\text{Y}_{1-a-y}\text{Gd}_a(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4\text{:Tb}_y(\text{Y}, \text{Gd})\text{BO}_3\text{:Tb}$ for the sample 14, a mixture of $\text{BaAl}_{12}\text{O}_{19}\text{:Mn}$ and $\text{Y}_{1-a-y}\text{Gd}_a(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4\text{:Tb}_y(\text{Y}, \text{Gd})\text{BO}_3$ for the sample 15, $\text{Zn}_2\text{SiO}_4\text{:Mn}$ for the sample 16, $\text{BaMgAl}_{14}\text{O}_{23}\text{:Mn}$, Eu , Mn for the sample 17, $\text{BaAl}_{12}\text{O}_{19}\text{:Mn}$ for the sample 18, and a mixture of $\text{BaAl}_{12}\text{O}_{17}\text{:Mn}$ and $\text{LaPO}_4\text{:Tb}$ for the sample 19, and the blue phosphors provided are $(\text{Ba}, \text{Sr})\text{MgAl}_{10}\text{O}_{17}\text{:Eu}$, $\text{Ba-Sr-Mg-Al}_{10}\text{O}_{17}\text{:Eu}$ for all of them. Therefore, as shown in table 2 large amounts of water and hydrocarbon group gases were adsorbed by these phosphors. The amounts of adsorbed water, in particular, were 2 to 5 times as large as compared to those of the embodied samples of this invention. The amounts of hydrocarbon group gases were also larger by 2 to 5 times, although absolute amounts of them are 1/5 to 1/10 of the water.

Please replace the paragraph, beginning at page 25, line 12, with the following rewritten paragraph:

For this reason, the reference samples 14 to 19 showed substantial decrease in brightness of the green and blue colors during the discharging operation, and many address errors were recorded especially when the partial pressure of Xe gas exceeds 10%. Since samples 16 and 18, in particular, use the green phosphors of single component, such as $\text{Zn}_2\text{SiO}_4:\text{Mn}$ and $\text{BaAl}_{12}\text{O}_{19}:\text{Mn}$, they adsorbed large amounts of water and hydrocarbon group gases, and exhibited especially large numbers of address errors and substantial degradation in the brightness attributable to the ultraviolet rays (in 147nm) and the discharge sustaining pulses.

Please replace the paragraph, beginning at page 25, line 21, with the following rewritten paragraph:

To this contrary, all of the panels having the green, blue and red color combinations of samples 1 to 13 showed only small degrees of change in the brightness of the individual colors attributable to the ultraviolet rays (in 147nm) and the discharge sustaining pulses, and they did not exhibit any reduction in the color temperature, address errors, and clogging of the nozzle in the process of depositing the phosphors. This is because they use the green phosphors made of any one or a mixed combination of $\text{M}_{1-a}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}$, $\text{M}_{1-a}(\text{Ga}_{1-x}\text{Al}_x)_2\text{O}_4:\text{Mn}$ of the spinel crystal structure containing aluminum, and $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Tb}_y(\text{Y}_{1-b-y}\text{Gd}_b)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Tb}_y$, $(\text{Y}_{1-a-y}\text{Gd}_a)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Ce}_y\text{Tb}_y(\text{Y}_{1-b-y}\text{Gd}_b)(\text{Ga}_{1-x}\text{Al}_x)_3(\text{BO}_3)_4:\text{Ce}_y\text{Tb}_y$, $(\text{Y}_{1-a-y}\text{Gd}_a)_3(\text{Ga}_{1-x}\text{Al}_x)_5\text{O}_{12}:\text{Tb}_y(\text{Y}_{1-a-y}\text{Gd}_y)_3(\text{Ga}_{1-x}\text{Al}_x)_5\text{O}_{12}:\text{Tb}_y$, and $(\text{Y}_{1-a-y}\text{Gd}_a)\text{BO}_3:\text{Tb}_y(\text{Y}_{1-b-y}\text{Gd}_b)\text{BO}_3:\text{Tb}_y$, all containing yttrium, instead of the conventional green phosphors which are liable to adsorb water and hydrocarbon, thereby restricting release of the water and hydrocarbon inside the panels, and preventing degradation in the brightness due to the discharge and address errors attributable to the deterioration of MgO.